Optimising treatment system for Kenaf (Hibiscus cannabinus) particleboard with fire retardants

ABSTRACT

Particleboard is widely used for panelling, partitioning and ceiling in buildings. The treatment of this material to improve fire performance is not an exception. A study was carried out to determine the fire performance of kenaf particleboard treated with phosphorous-based fire retardants. Kenaf core particles were first treated separately with 8 and 10% solutions of monoammonium phosphate (MAP), diammonium phosphate (DAP) and a mixture of boric acid, guanylurea phosphate and phosphoric acid (BP®) using hot and cold bath processes. The soaking time needed to achieve the standard dry salt retention, i.e. 50 kg m-3 was determined. Particleboards from these treated kenaf particles were fabricated and their fire performance evaluated. Using 8% treating solution, it took about 36, 21 and 48 min of immersing in cold bath to achieve the standard retention requirement for MAP, DAP and BP® respectively but for 10% concentration, the times were slightly shorter, i.e. 15, 20 and 35 min respectively. Among the three phosphorous formulations, BP® showed the best performance in improving the insulation and integrity of kenaf particleboard when exposed to fire. This is followed by MAP and DAP. BP®-treated board was the last to ignite compared with the other two boards.

Keyword: MAP; DAP; BP; Hot and cold bath; Fire resistance; Early burning performance